

# **EXHIBIT 2**

IN THE UNITED STATES DISTRICT COURT  
FOR THE MIDDLE DISTRICT OF GEORGIA  
VALDOSTA DIVISION

JOSE HERNANDEZ and PRISCILLA  
HERNANDEZ,

*Plaintiffs,*

v.

CROWN EQUIPMENT CORPORATION,

*Defendant*

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CIVIL ACTION  
FILE NO. 7:13-CV-91(HL)

AFFIDAVIT OF RUSS RASNIC, P.E.

I, Russ Rasnic, P.E., being over the age of 18 and otherwise competent to execute this affidavit, affirm under the penalties of perjury that the following statements are true and within my personal knowledge:

1. The science of mechanical engineering is based upon well established laws of physics and known principles that apply to machinery. It is a hard science in the sense that the principles involved are well known and objective. These principles are universal and apply to all machines.
2. I hold a Bachelor's and Master's degree in mechanical engineering from the University of Arkansas. I successfully completed my training in mechanical engineering, including material on safety in the design, manufacture, and use of mechanical devices. I am licensed as a Professional Engineer by examination and hold individual licenses in 9 states, and am a member of the American Society of Mechanical Engineers (ASME), Society of Automotive Engineers (SAE), American Society of Metals (ASM), National Safety Council (NSC), Human Factors and Ergonomics Society (HFES), Institute of Electrical and Electronic Engineers (IEEE). I was elected to the Arkansas Academy of Mechanical Engineering (AAME) in 2007. During my manufacturing career, I was also a member of the Material Handling Industry of America (MHIA). I routinely attend continuing education and professional competency seminars on matters of interest to mechanical engineering and have taught these as well. I also taught junior level mechanical engineering labs as a part of my graduate work, and have been a guest lecturer on Safety in Design for Senior level mechanical engineering design classes at the University of Arkansas.

3. I have extensive experience in applying my engineering education in real world situations. As my C.V., which is attached, demonstrates, I have spent over twenty years in manufacturing, in roles ranging from manufacturing engineer to President and Chief Executive Officer of companies engaged in the manufacture of mechanical, electromechanical and hydraulic devices.
4. In my roles as an engineer, engineering manager and product development manager, I designed numerous parts, machinery and product lines, including forklifts, lift tables, dock equipment and forklift attachments. Many of these machines incorporated the same manufacturing processes and methods of transmitting movement as the subject Crown RR5225-45 reach truck involved in this accident. Specifically, the machines were constructed of steel and other materials, and utilized hydraulic, mechanical and electrical controls to accomplish their required functions, including directional movement. One of these electro-hydraulic lifting machines was selected as a design finalist in Plant Engineering's "Product of the Year" competition for material handling in 1990.
5. In my roles as engineering manager and operations/plant manager, I was a member of two manufacturer's groups, the Lift Manufacturers Product Section (LMPS) and the Loading Dock Equipment Manufacturers Association (LODEM) of the Material Handling Industry of America (MHIA), which developed three ANSI (American National Standards Institute) standards: MH 29.1, MH 29.2 and MH30.1. These standards related to safety of industrial equipment, specifically hydraulic lifting devices, which utilize functions similar to those used on the subject Crown lift truck. ANSI does not create standards, they are merely the body that manages standards created by other industry organizations. The aforementioned standards that I assisted in creating met all of the requirements to be designated and adopted by ANSI.
6. I have had training in automobile accident reconstruction through the Society of Automotive Engineers, as well as in ergonomics through the Material Handling Industry of America. I taught ergonomics and human factors principles to my employees, customers and sales force during my 10-1/2 year tenure with the Rol-Lift Corporation. As an engineering manager at this material handling equipment manufacturing company, a portion of my duties involved failure analysis and accident reconstruction on equipment manufactured by my employer. I have never held myself out as a biomechanical engineering expert and have not offered opinions in this case or any other relative to this area.
7. All engineers who design equipment that is to be utilized by human beings must necessarily be knowledgeable in human factors, since integral to the design process is the analysis of the utility of the product and how human



beings will interact with it. Over half of my career in industry was spent designing products and setting up production processes, and I gained my human factors knowledge through on the job training and the aforementioned affiliations. I have designed or redesigned at least six major product lines that involve equipment used to lift materials. Those product lines include pallet trucks, forklifts, lift tables, dock equipment, and forklift attachments. Spin-offs and iterations of these products that I have designed number in the hundreds. I have evaluated human factors issues in other cases, such as fire truck headroom and heavy equipment cab layouts and have also served on the Ergonomic Assist and Safety Equipment (EASE) council of the MHIA, which dealt with ergonomics and human factors on lifting equipment. I am Full Member of the Human Factors and Ergonomics Society (HFES), eligibility for which requires "a bachelor's degree from a regionally accredited college or university and five full time years of applicable experience in human factors work" (Full member membership category requirements as listed on the HFES website). This eligibility is evaluated by the membership admissions committee of the society. Crown's manager of product safety, Ron Grisez is only an Affiliate Member of this organization, which is "any person who is interested in the human factors field, but who does not qualify for Full Member or Associate status."

8. As a materials handling equipment plant manager, as well as a manufacturing engineer, recognition of hazards associated with machines and material handling, and abatement of hazards through guarding and safety systems/methods was an integral part of my job duties for the fifteen years prior to my employment with Ryan Engineering, Inc.
9. My plant manager and manufacturing engineer duties encompassed daily walkthroughs of the production facility to identify and correct any OSHA (Occupational Safety and Health Administration) violations associated with the operation. This included continuous material handling with forklifts, cranes, and other devices, and involved the lifting/transport of materials and personnel on a daily basis. In the over six years that I managed a materials handling equipment manufacturing plant, my facility was exempt from OSHA inspections. This exemption was obtained through this proactive approach to hazard identification and abatement and monitoring by the state of Arkansas Department of Labor. I have also performed machine guarding surveys and hazard evaluations for numerous manufacturing facilities in both North and South America. Much of these evaluations dealt with material handling.
10. I developed and taught a course entitled Safety Engineering and Hazard Evaluation. This course was approved by the Arkansas State Board of Registration for Professional Engineers as a continued professional competency course for registered engineers.

11. In addition to design of products and components, I have managed the production of same. Design and manufacturing processes are rarely unique for a particular product or industry, and the lifting equipment issues in this case are no exception. I am familiar with, and have extensive experience in not only the design and manufacture of lifting equipment, but its safety and use as well.
12. In addition to my mechanical, electrical and hydraulic design background, I have practical experience with hydraulic lifting equipment as well. I have been operating forklifts since 1978, including in a production capacity while in college. I have managed forklift operators and forklift fleets, and have been trained on numerous types and configurations of forklifts. I have also been a forklift operator trainer since 2003. This certification includes class II trucks of the type involved in this matter. I have operated heavy machinery, including backhoes, trackhoes, packers, wheel loaders, loaders, tractors, skid loaders, bulldozers and aerial lifts during the course of my employment in industry, as well as in my current consulting role. I have setup and taught forklift safety programs for my employers. I presently own through my company, and operate on a regular basis, five ANSI B56 style forklifts (the standard that applies to the subject Crown RR5525-45 machine). This includes a stand up rider, order picker style machine and a low lift, stand up rider style truck that are part of the fleet, and I have trained employees on operation of both of these types of trucks. The drive, parking brake and plug braking systems on these machines are nearly identical to the subject truck.
13. I possess both design and maintenance experience with forklifts, as well as extensive operational experience with electrically driven machines, as noted above. I designed the drive systems for other types of ANSI B56 style forklifts and managed their production for over half of my 20 year industrial career. The drive systems of these machines utilized similar components and performed in a similar manner as the drive system on the subject Crown RR5525-45. Specifically, they incorporated motor controllers, plug braking and parking brake systems, which is precisely the area of interest in this case. I also managed the warranty and service department for the aforementioned forklifts and other products for approximately 8 years.
14. My opinions relating to safety and design stem from over twenty years of experience in the design of products and the management of equipment production facilities.
15. The Crown RR5225-45 lift truck is a piece of mobile, electro-hydraulic lifting equipment. I have designed and/or managed the manufacture of mobile electro-hydraulic lifting equipment for over ten years. At least 30



of the products on which I have previously offered expert mechanical engineering testimony are electro-hydraulic lifting machines, and at least 8 of these involve ANSI B56 style forklifts, including a similar style Crown machine. There are numerous others that resolved prior to my being deposed. These matters include several class II, narrow aisle trucks of the style involved in this case. The fact that I found no design defect in a prior case involving Crown is irrelevant, as the issues in that matter were different than those in this litigation.

16. I have published numerous, internally peer reviewed documents relating to ANSI B56 style lift trucks and attachments for the Rol-Lift Corporation. I have created technical data, operation, maintenance and service manuals. I have also published information on the manufacture of these machines for use in the production process.
17. Defense counsel has asserted that I performed no testing on alternative designs. Testing for the sake of testing is a waste of both effort and money, particularly when proposed alternative designs have already been tested and proved on competitive models in the same industry. The right foot brake pedal exists and has existed for many years on at least two other major manufacturers' stand up, narrow aisle rider lift trucks, including those predating the manufacture of the subject machine. Additionally, my design background and engineering experience permit opinions on this particular issue without testing, since it is intuitively obvious to me that a right foot actuated brake pedal is entirely feasible and compatible with the existing design since it only actuates a simple switch to operate the electric brake, and this can be accomplished just as easily with the opposite foot. In fact, defense counsel conveniently omitted the rest of my deposition testimony on page 100 of his reference, where I stated that Crown has a pedal on the right side of the existing machine already. Since both the right and left pedals simply engage on/off switches, swapping their functions would have no impact on the operational component of the machine whatsoever (Rasnic, pp. 100-101), and the feasibility of using a right pedal to actuate a switch is already proved in this case on the very machine that is the subject of this litigation. Additionally, I provided specification sheets describing 3 other competitive trucks with right pedal designs in my deposition, and these were collectively marked as exhibit 82.
18. Testing to compare operator stability on right foot pedal actuated, side stance machines with 3 sides and an opening on the left side is similarly unnecessary. I have personally conducted numerous stability studies on a variety of equipment to determine stability, both during my stint in industry and in my present role as a consultant. This includes stability of humans on machines. Fundamental to the physics of stability is the location of the center of gravity, be that of a person or a machine. When

the center of gravity moves outside the footprint of the machine or person, imbalance is the result. It is intuitively obvious due to my education, training and experience that a person who raises his left foot off the ground will fall to the left in the absence of a counteracting movement to shift the person's center of gravity back over the location of the right foot, since the center of gravity of a typical person is symmetrical and located essentially in the middle of the torso in the coronal (frontal) plane. In a panic situation, when deceleration is unanticipated and movement of the operator is to the left on the subject truck, there is nothing to stop him from falling toward the opening. In a similar circumstance with the right foot being raised, the natural movement of the body is to the right, which would counteract deceleration in the opposite direction toward the opening. Additionally, the close proximity of the operator to the enclosed right side of the operator's compartment would prevent or minimize movement in this direction for opposite direction braking. This information was contained in the report I produced in this matter.

19. Neither Crown's operation nor service/parts manual denotes that power steering remains enabled after the foot is removed from either the right or left pedal. In fact, the service manual does not discuss the electrical functions of the power steering at all, and calls the right pedal actuated switch (DMS1) an "interlock switch," whose purpose "limits truck operation when operator's foot is not in proper position." What constitutes this limited operation is never defined. There is no mention of power steering with regard to the brake pedal actuated switch (BRS1) at all. Electrical diagram descriptions are further devoid of what happens inside the controller when these switches are disengaged. The operator's manual simply states that the steering pump will start running when the right foot is placed on the sensor pedal (pad) and left foot is placed on the brake pedal. Nothing has been produced by Crown that details how or if the power steering remains enabled after the pedal switches are disengaged, other than the representations of Crown's manager of product safety, Ron Grisez, though design information was requested as part of discovery. Mr. Hernandez testified that the steering locked up during the accident sequence in conjunction with a loss of plug braking. Additionally, there are at least 25 instances of reported steering failures in accident reports produced by Crown on stand up rider machines, so this is not an isolated event. However, irrespective of how the power steering functions, its contribution to this accident is incidental. Mr. Hernandez would have still lost his balance and come out of the machine as a result of this design, and changing the pedal functions as noted herein would have no operational effect on the steering or other truck operation.
20. With regard to the "larger, more sensitive sensor pad," lack of testing allegations, defense counsel is being disingenuous and misrepresenting the facts to the court. In both my report and deposition, I qualified my



recommendations regarding making the sensor pad larger and more sensitive in the context of, if foreseeable deceleration as a part of normal operation does indeed cause the right switch to become disengaged due to slight movement of the operator, a simple fix is to make the design such that the switch will stay engaged under these circumstances. This too, is intuitively obvious to me based on my education, training and experience, and I have designed numerous switch engagement systems on electro-hydraulic materials handling equipment that incorporate these very principles; thus, the concept has already been proved in use. I also noted that a power steering failure could be the result of a POSSIBLE intermittent fault that would be difficult to detect and diagnose (Rasnic, pp. 121 – 125).

21. Crown's backrest design on the subject truck uses a slight wrap around on the left side, ostensibly to try to inhibit operator motion toward the opening during deceleration. This wrap is very slight and its profile is a smooth curve. The backrest material is also very smooth and the design is ineffective in preventing the occupant from sliding off of it, as noted during my testing of the subject truck. A better solution to protect occupants is the aforementioned foot pedal change, but as noted in my report on page 16, if Crown decided not to implement this safer design, then a backrest design that provides more resistance to deceleration toward the opening would be in order. Defense counsel is again misrepresenting the entirety of my testimony on this issue in the motion on page 12. My recommendation was actually a better backrest wrap or an additional, stepped pad that would provide a positive stop for the operator when his body is pushed up against it. This was the very next answer following the quote in the motion, and the complete context of the backrest recommendations are contained on the pages preceding and following (Rasnic deposition, pp. 127 – 130). This design presently exists on competitive machines and does not need to be tested, since its viability is already proved. I operated this style of machine in another litigation matter with regard to a completely different issue, but noted its effectiveness in preventing my movement toward the opening in the operator's compartment. The Defendant also seeks to limit my testimony regarding a different style of control due to lack of prototyping and testing, when a viable alternative is again available on a competitor's unit, and has been since at least the year 2000. Similarly, it is intuitively obvious based on my education, training and experience, that a rigid handhold will provide more stability for an operator than a control handle that moves.
22. Regarding causation opinions being based on the plaintiff's testimony, there were no eyewitnesses to the accident. Thus, any other testimony or accident reports would be based strictly on the plaintiff's representations and speculation. In addition, I reviewed the maintenance records, as communicated to Defense counsel in the sentence just prior to his citation



on page 15 of the motion (Rasnic, p. 67), including the records of the inspection of the truck after the accident. I have since read post-accident reports and testimony of Lowes employees who conducted the investigation and inspected the truck, and they do not change my opinions at all. As with many infrequent occurrences of problems associated with electrical controls, machines will often function as designed after an unexpected event and do not show a trouble code. They are therefore, deemed "fine" by mechanics who investigate them afterward. For instance a stuck or out of adjustment switch or contactor will often be corrected as a result of an impact; thus nothing appears to be malfunctioning. I have personally investigated numerous accidents on forklifts and other equipment where this was precisely the case. As noted earlier, there are at least 25 other instances of Crown stand-up riders failing to plug brake or losing steering and causing an accident (collectively marked as exhibit 76 to my deposition). In several of these cases where after accident investigations were performed, the machine is listed as operating properly. Intermittent faults are just that, they show themselves occasionally. There is no documentation that lists prior instances of power steering failures occurring on this particular machine. However, that does not mean a fault could not have occurred prior to this accident, or that prior incidents of this type were not reported. And contrary to the representations made by Defense council, I did not opine that the cause of the accident was the loss of power steering. My opinion was that this loss of steering started the sequence that led to the accident. The accident was caused by Mr. Hernandez unintentionally falling from operator's compartment and being struck by the machine, as noted in my report on page 3.

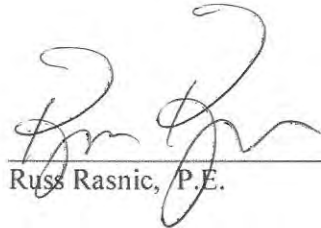
23. The location of Mr. Hernandez' foot below the plane of the floorboard when it was crushed permits only one sound conclusion regarding how his foot arrived in this location, irrespective of what the Defendant's experts opine. To say that no deceleration value will cause bodily instability is ludicrous, as one only has to lift up one foot and they will fall in that direction in the absence of any other horizontal force, unless there is a shift of the upper portion of the body to counteract the now unstable position of the center of gravity of the body, as noted earlier. How quickly one reacts to this unstable condition determines: a) whether they will fall, or b) how far out they must place the elevated foot to prevent the fall. Given how close the left foot is to the outside edge of the operator's compartment during normal operation of the subject truck (a few inches to virtually no distance at all), it is entirely plausible that operator reaction could cause his leg to leave the safety of the operator's compartment, and that with no surface to stop motion the leg would move outward and down, allowing it to be crushed between the skirt of the machine and the curb where Mr. Hernandez' leg was crushed. This curb is only 6-1/8 inches tall, and the height of the operator platform on the truck is approximately 9.5 inches. Crown's expert, Thomas McNish opines that

Mr. Hernandez' foot would have to be fully outside the operator's compartment, with his toes 8 inches below the threshold, and that the toes would have to be pointed downward. This is consistent only with a loss of balance and not of an operator voluntarily placing his foot outside the machine as suggested by both McNish and Grisez. Voluntarily resting the foot outside the machine would be most comfortable when the operator has it in essentially the same plane as the platform, and would be required if the brake pedal was to remain depressed. If the entire foot was outside the confines of the operator area, then it would necessarily be off of the brake pedal and the machine would not move, or would rapidly decelerate if it were moving. If Mr. Hernandez were trying to stick his foot out to stop the machine from running into the curb, he would certainly not point his toes down and bend his other leg to get them into a position below his other foot, as this would not provide any leverage. Since the curb is only 12-1/2 inches deep, and there is a rack upright immediately on the other side, a much more viable location for the foot/leg to be placed if Mr. Hernandez were attempting to stop the machine would be ABOVE the floorboard, with the toes pointed primarily upward. My opinions on how the leg escaped from the operator's compartment are supported by the evidence; the Defense experts' conclusions are not. Outfitting a body with an accelerometer and performing "testing" by trying to simulate how a person reacts in a panic situation in this type of scenario is completely irrelevant and cannot be done reliably. I can opine with a reasonable degree of engineering certainty that there are numerous body orientations where an operator's leg can be thrown out of the operator's compartment during deceleration provided by the machine, even at the rates cited by Grisez and McNish, based on the aforementioned facts, and my education, training and experience.

24. Defense counsel is also being disingenuous with regard to whether my opinions were peer reviewed, as he did not ask me this question. As a matter of procedure my opinions in every case are peer reviewed by other engineers at Ryan Engineering, and this matter was no exception. This peer review is clearly denoted on the company's invoice for February on line item 2. This invoice was part of a group of invoices collectively marked as Exhibit 84 A to my deposition.
25. Finally, Defense counsel would seek to exclude an opinion I do not have regarding to my deference to other experts who were retained to discuss the viability of a door on the machine. Therefore, the arguments regarding my lack of any relevant testing or prototyping are beyond what any reasonable person would consider germane to this matter or motion.
26. The evidence I reviewed in this case was more than sufficient, is reasonably reliable, and is of the type customarily used by engineers to opine with a reasonable degree of engineering certainty.

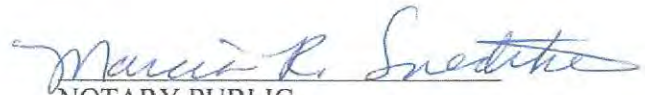


FURTHER AFFIANT SAYETH NOT:

  
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Russ Rasnic, P.E.

STATE OF ARKANSAS   §  
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COUNTY OF BENTON §

SUBSCRIBED AND SWORN TO BEFORE ME, the undersigned authority, by  
Russ Rasnic, P.E., on this the 21<sup>ST</sup> day of August, 2014.

  
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NOTARY PUBLIC  
STATE OF ARKANSAS

